DOI : 10.15613/sijrs/2018/v5i2/207620
ISSN (Print): 2349-8919
ScieXplore: International Journal of Research in Science, *Vol 5(2), 22-26, July - December 2018* *ISSN (Online): 2350-0999*

Phytochemical Study and Antioxidant Activity of *Ocimum tenuiflorum* and *Ocimum sactrum*

S. Valarmathi* and S. Thamilarasan

Department of Biochemistry, PSG College of Arts and Science, Coimbatore – 641 014, Tamil Nadu, India; valarmathi@psgcas.ac.in

Abstract

Objective: The objective of the study is to find out the phytochemical compounds and antioxidant activity of Ocimum tenuiflorum and *Ocimum sactrum* leaves. The various plant extracts were prepared and the analysis was carried out using the extract having higher phytochemical compounds. Carbohydrate, protein, alkaloids, flavonoid's, phenols, saponins, tannins and glycoside's was carried for both qualitatively and quantitatively in the medicinal plants. The result obtained from present study provides a confirmation that hydroethanolic extract of *O. tenuiflorum* and *O. sactrum* leaves contains various phytochemical analysis, which justifies the use of the sample as traditional medicine for treatment of various disease. The antioxidant analysis was carried out for both enzymic and non-enzymic, which forecasts the scavenging activity of the sample. The finding of study suggests that this plant leaves could be a possible source of natural antioxidant that could have great importance as remedial agents in preventing various diseases. The results obtained were much hopeful, but scientific validation is necessary before being put into practice.

Keywords: Antioxidants, *Ocimum tenuiflorum* and *Ocimum sactrum,* Phytochemicals

1. Introduction

Plant derived drugs take part in the evolution of human healthcare for several years. Medications can trigger allergic or pseudo allergic reaction, specific chemotherapeutic agents are associated with organ-toxicities, including cardiovascular disease, interstitial lung disease and occasionally secondary neoplasm[2]. Medicinal plants have been used for many years in ancient medicines in Asian and African populations and various plants are consumed for their health benefits in developed nations[7]. For the treatment of several diseases, traditional medical practitioners utilized plants, since time immemorial. Current studies show that plants has many active agents owed to which they state more synergic effect than any single active compound[6]. *Ocimum tenuiflorum* possesses primary metabolites in leaves like total soluble sugar, lipid, protein and phenol Tulsi leaves, involving eugenol. The active constitute present in O. teuniflorum, has been found to be largely responsible for the therapeutic potentials.

2. Materials and Methods

2.1 Plant Collection and Preparation

The leaves of *Ocimum tenuiflorum* and *Ocimum sactrum* were collected from the areas of Coimbatore district, Tamil Nadu, India. The collected plant leaves were shade dried, powdered and 50 g of each leaves were mixed with different solvent such as water, hydroethanol, ethanol, acetone, chloroform and petroleum ether separately in round bottom flask and keep air tight for 72 hours and shaken frequently for uniform mixing. Then it is filtered through a Whatmann No.1 filter paper and the solvent is evaporated to dryness.

**Author for correspondence*

2.2 Qualitative and Quantitative Analysis of the Sample

The qualitative[13] and quantitative phytochemical analysis[11] were performed for the existence of the Proteins, Alkaloids, Flavonoids, Starch and Amino acids using standard methods.

2.3 Enzymic and Non-enzymic Antioxidants

The enzymic (Peroxidase, Superoxide dismutase and Reduced glutathione) and non-enzymic (Ascorbic acid, Vitamin A and α-Tocopherol) antioxidants were analyzed[11].

3. Results

3.1 Qualitative Phytochemical Analysis

The qualitative phytochemical screening of the plant extracts was shown in the Table 1 and 2, which exposed the

Table 1. Phytochemical analysis of the sample

Test	*(Ot)* Water extract	Ethanol extract	Hydro ethanol extract	*(Os)* Water extract	Ethanol extract	Hydro ethanol extract
Wagner test	+	-	+	+	-	+
Phenol	++	-	+	-	-	-
Lead	+++	+	+	-	-	+
Mayer	-	-	-	-	-	-
Starch	-	-	-	-	-	-
Steroid	+	-	+	+	-	-
Flavonoid	+	-	+	+	+	+
Amino acid	+++	+	+++	+	-	+
Cholesterol	+	+	+	+	+	+
Tannin	+	+	+	-	-	-
Glycoside	+	+	++	+	-	++
Protein	++	+	+	+	-	++

Table 2. Phytochemical analysis of the sample

Test	(Ot) Acetone	Benzene extract	50% Petroleum ether extract	(Os) Acetone extract	Benzene extract	50% Petroleum ether extract
Wagner Test	-	+++	-	-	+++	-
Phenol	++	+++	-	+	+++	-
Lead	-	-	-	-	-	+
Mayer	+	+++	+	+	+++	-
Starch	-	-	-	-	-	-
Steroid	-	+++	-	-	+++	-
Flavonoid	-	+++	-	-	+++	-
Amino acid	+	+++	-	+	+++	-
Cholesterol	+	+++	+	+	+++	+
Tannin	-	+++	-	-	+++	-
Protein	-	+++	-	-	+++	-
Glycosides	+	++	-	+	+++	-

existence of carbohydrate, protein, alkaloids, flavonoid's, phenols, saponins, tannins and glycoside's. The substance which is present in high level in the extract are showed "+++" and moderate level as "++" lower level as "+" and in absence "-". From the result it was predicted that the benzene extract was found to have more phytochemical compounds when compared to the other extracts. Hence, the sample prepared using benzene extract was taken for the further analysis. The beneficial medicinal effect of plant material typically results from the combination of secondary product present in the plant[3,10]. In[4] identified the phytochemical compounds and antioxidant action of crude plant extracts from Ephedra intermedia.

3.2 Quantitative Phytochemical Analysis

3.2.1 Estimation of Primary Metabolites

The concentration of primary metabolites like Carbohydrate, Protein and Glycosides of the sample were analyzed and shown in the Table 3. The amount of the primary metabolites was found to be high in *Ocimum tenuiflorum* (Carbohydrate = 4.516 mg/g; Protein = 4.897 mg/g; and Glycoside = 3.766 mg/g) when compared to *Ocimum sactrum* (Carbohydrate = 4.033 mg/g; Protein = 1.209 mg/g and Glycosides = 4.566 mg/g).

Earlier workers observed the leaves of *Ocimum tenuiflorum* L. extracted has high carbohydrate content and concluded that Cymbopogon citratus is very good source energy[8]. The presence of elevated potential level in the plant parts towards their passable raised the food value.

3.2.2 Estimation of Secondary Metabolites

Quantitative assay of secondary metabolites was carried out for the estimation of Flavonoids, Steroids and Total phenol and the results were shown in the Table 4. The concentration of the secondary metabolites was found to be high in *Ocimum tenuiflorum* (Flavonoids = 3.97 mg/g; steroids = 4.44 mg/g and Phenol = 2.96 mg/g) when compared to *Ocimum sactrum* (Flavonoids = 3.66 mg/g; Steroids = 3.99 mg/g and Phenol = 1.483 mg/g).

Table 3. Primary metabolites of the sample

Primary metabolites	***Ocimum tenuiflorum* mg/g**	***Ocimum sactrum* mg/g**
Carbohydrate	4.516±0.124	4.033±0.051
Protein	4.897±0.148	1.209±0.097
Glycoside	3.766±0.130	4.566±0.040

Values are means of three independent analyses ± SD (n=3)

Table 4. Secondary metabolites of the sample

Secondary metabolites	***Ocimum tenuiflorum* mg/g**	***Ocimum sactrum* mg/g**
Flavonoids	3.97±0.24	3.66±0.44
Steroids	4.44±0.47	3.99±0.27
Phenol	2.96±0.45	1.483±0.37

Values are means of three independent analyses ± SD (n=3)

The phytochemical analysis illustrated that the Ephedra intermedia plant extract contains a blend of phytochemicals like reducing sugars, cardiac glycoside, phenolic compounds, flavonoids and alkaloids[4]. Epidemiological studied have showed that there is an association between consumption of phenolic rich food beverages and various disease such as stroke cardiovascular disease and cancer[9].

3.3 Enzymic Antioxidant Assay

Enzymatic antioxidants toiled by breaking down and removal of free radicals. The antioxidant enzymes translate hazardous oxidative products to hydrogen peroxide (H_2O_2) and then to water, in the presence of cofactors like copper, zinc, manganese and iron. The level of enzymic antioxidants of the sample is shown in the Table 5. The peroxidase enzymatic activity of *Ocimum tenuiflorum* and *Ocimum sactrum* was found to be 3.70 U/g and 2.83 U/g respectively.

The SOD activity of *Ocimum tenuiflorum* and *Ocimum sactrum* was found to be 2.42 U/g and 1.80 U/g. Hence, the reduced Glutahione activity of the sample was determined as 1.62 U/g and 1.32 U/g respectively. The result obtained from the sample showed that the *Ocimum tenuiflorum* was found to have high level when compared to *Ocimum sactrum*. Hence, the defense mechanism of *Ocimum tenuiflorum* is better to neutralize the effects of reactive oxygen species. In[5], observed the similar outcome in the antioxidant and radical scavenging activity of Ocimum basilicum. The increase in the Super oxide dismutase and Catalase activities formed by treatment with herbal extract effectively eliminates the superoxide and peroxides produced by the compound intoxication[12].

3.4 Non-enzymatic Antioxidant Assay

Non-enzymatic antioxidants work by interrupting free radical chain reactions. The result of the non-enzymatic antioxidant assay was shown in the Table 6. The *Ocimum tenuiflorum* exposed high level of Ascorbic acid, Vitamin A and α-Tocopherol when compared to *Ocimum sactrum*. Hence, it has an ability to rapidly inactivate free radicals and oxidants in the body.

The mechanism of action of enzymic and non-enzymic antioxidants is based on the amendment of cell metabolic functions, playing a defensive role against the ROS that are formed from photosynthetic and respiratory processes[1].

Table 5. Enzymic antioxidant activity of the samples

Enzymatic antioxidant	***Ocimum tenuiflorum*** **U/g**	***Ocimum sactrum*** **U/g**
Peroxidase	3.70±0.30	2.83±0.34
Superoxide dismutase	2.42±0.22	1.80±0.47
Reduced glutathione	1.62±0.51	1.32±0.47

Values are means of three independent analyses ± SD (n=3)

Table 6. Non-enzymatic antioxidant activity of the samples

Non-enzymatic antioxidant	***Ocimum tenuiflorum*** **U/g**	***Ocimum sactrum*** **U/g**
Ascorbic acid	2.70±0.22	2.31±0.34
Vitamin A	4.42±0.35	4.10±0.31
α-Tocopherol	3.43±0.43	2.92±0.41

Values are means of three independent analyses ± SD (n=3)

4. Conclusion

The qualitative phytochemical analysis exposed the presence of carbohydrates, proteins, alkaloids, phenols, flavanoids, saponins, glycosides, steroids, amino acids and tannins. The quantitative estimation of the sample showed the concentration of proteins, carbohydrates, steroids, starch and phenols, which associated the medicinal value. The *Ocimum tenuiflorum* screened the phytochemical constituents, which possessed the high amount when compared to the to *Ocimum sactrum*. The antioxidant activity of the samples also assessed the scavenging activity against free radicals and proved that it has the impending to act as a source of therapeutic drugs to improve the health status of the consumers. This method of analysis is the preliminary study and can be further subjected for the characterization and cytotoxic work.

5. References

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